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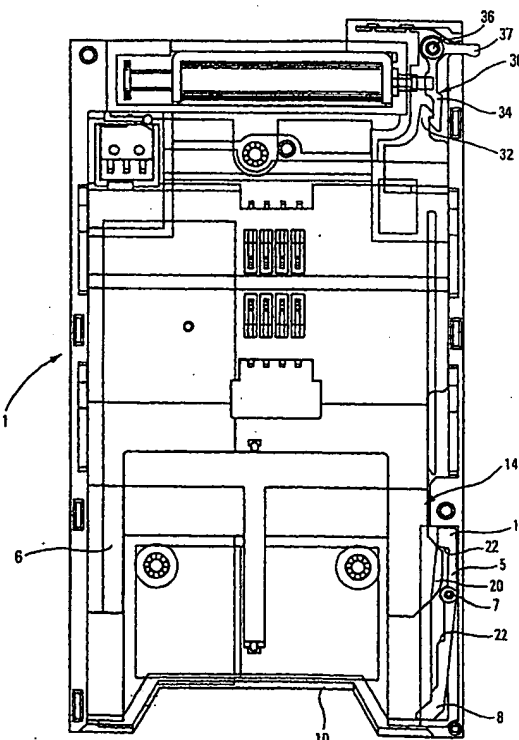
## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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(54) Title: LOCKABLE SMART-CARD CONNECTOR

## (57) Abstract

The invention relates to a lockable connector (1) for a smart-card (2), which includes a movable carriage (6) intended to bring the smart-card (2) from a first position, in which the said card (2) projects to the outside of the connector (1), into a second position, in which the said card (2) is immobilized inside the said connector (1) in order to be read. According to the invention, the said connector (1) includes a lever (5) which is mounted so as to pivot about a pin (7) and has a first end (8) extending near the inlet (10) of the connector (1) and a second end (12) extending towards the inside of the connector (1) and in that the said carriage (6) includes at least one arm (14) which, on the one hand, laterally pushes back the said first end (8) of the pivoting lever (5) in order to allow the smart-card (2) to be inserted into the connector (1) when the carriage (6) is in the first position and, on the other hand, laterally pushes back the second end (12) of the pivoting lever (5) when the carriage (6) is in the second position in such a way that the first end (8) of the lever (5) at least partially closes off the inlet of the said connector (1).



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### LOCKABLE SMART-CARD CONNECTOR

The present invention relates to a lockable smart-card connector operating according to the landing-type technology.

The invention relates more particularly to a connector which includes a movable carriage intended to bring the smart-card from a first position, in which the said card partially projects to the outside of the connector, into a second position, in which the said card is immobilized inside the said connector in order to be read.

In applications using smart-cards, it is important to be certain that the card is inserted correctly and remains in the position which allows nominal operation of its microcircuit. For this purpose, the movable carriage carrying the smart-card has to be positioned correctly.

The prior art, especially German Patent Application DE-195 21 360, teaches a locking system which allows the carriage carrying the card to be immobilized in the desired position. Such a system consists of a lever which must be pushed manually once the card is inserted into the reader, the said card being pushed right into the required position.

A drawback of this system stems from the fact that it requires manual intervention by the user in order to insert the smart-card into the connector and also to withdraw it therefrom.

One objective of the invention is to produce a connector in which the smart-card is positioned and locked in the connector, as well as unlocked and ejected, in an automatic manner without intervention by the user.

Another objective of the invention is to prevent a second card from being inserted in error into the connector.

In order to achieve these objectives, the connector according to the invention is characterized in that it includes a lever which is mounted so as to

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pivot about a pin and has a first end extending near the inlet of the connector and a second end extending towards the inside of the connector and in that the said movable carriage includes at least one arm which, on the one hand, laterally pushes back the said first end of the pivoting lever in order to allow the smart-card to be inserted into the connector when the carriage is in the first position, and on the other hand, laterally pushes back the second end of the pivoting lever when the carriage is in the second position in such a way that the first end of the lever at least partially closes off the inlet of the said connector.

With such a system, it is therefore no longer necessary to manually actuate a lever in order to lock the smart-card in the read position. Furthermore, the fact that the first end of the lever at least partially closes off the inlet of the said connector prevents a second card from being inserted in error into the connector.

Other features and advantages of the invention will emerge from the description which follows, taken by way of non-limiting example, with reference to the appended figures in which:

- Figure 1 shows a top view of a connector according to the invention;

- Figure 2 shows a perspective view of the connector of Figure 1 into which a smart-card (an unlocked card) has been partially inserted and of a cover intended for covering this connector;

- Figure 3 shows a perspective view of the connector of Figure 1 in which a smart-card (a locked card) has been fully inserted and of a cover intended for covering this connector.

Figures 1, 2 and 3 show views of a lockable connector 1 for a smart card 2, which includes an insulating support 4 on which a carriage 6 is movably mounted, the said carriage 6 being intended to bring the smart-card 2 from a first position, for example

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that shown in Figure 2, in which the card 2 projects to the outside of the connector 1, into a second position, shown in Figure 3, in which the said card 2 is immobilized inside the said connector 1 in order to be read.

At the moment when the card is inserted into the connector, the movable carriage 6 lies to the rear in a first position, thus held in place by means of a return spring (not shown).

As may be seen in these Figures 1, 2 and 3, the connector 1 includes a lever 5 which is mounted so as to pivot about a pin 7 and has a first end 8 extending near the inlet 10, the said first end 8 being slightly curved in the direction of this inlet 10, and a second end 12 extending towards the inside of the connector 1. The carriage includes an arm 14, which, when the carriage 6 is in the first position shown in Figure 2, laterally pushes back the first end 8 of the pivoting lever 5 in order to allow the smart-card 2 to be inserted into the connector 1. When the card 2 comes into abutment at the front of the movable carriage 6, said card, continuing to be pushed forwards, entrains in its movement the said carriage 6. At the end of travel, this movement consequently means that the arm 14 laterally pushes back the second end 12 of the lever 5, thus making the said lever 5 pivot about the pin 7. In this way, the first end 8 at least partially closes off the inlet 10 of the said connector 1, as shown in Figure 3.

According to a preferred embodiment of the invention, the arm 14 of the carriage 6 has projection 20 which exerts a thrust on the first end 8 (or alternatively the second end 12) of the lever 5 when the carriage 6 is in the first position shown in Figure 2 (or alternatively in the second position shown in Figure 3). Preferably, each of the ends 8, 12 of the lever 5 has at least one inclined plane 22 which interacts with the projection 20 of the arm 14 of the carriage 6 in order to make the said lever 5 pivot

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about the pin 7. Furthermore, the connector 1 includes a locking system 30 intended to immobilize the said carriage 6 in the position for reading the card 2. The said locking system preferably includes a first hook 32, integral with the carriage 6, which locks onto a second hook 34 which is mounted so as to pivot on a pivot pin 36 arranged at the bottom of the connector 1 and which possesses, in the example shown, a finger 37 operable from the outside. It may be noted here that this action can also be carried out internally by means of an electromagnet.

The card 2 is unlocked by making the second hook 34 pivot, in this case by means of the external finger 37, this second hook 34 releasing the first hook 32 on the carriage 6. The latter is then automatically pushed back towards the outside of the connector 1 under the action of the return spring (not shown). When the carriage 6 is pushed back far enough to the outside of the connector 1, the projection 20 laterally pushes back the first end 8 of the lever 5 again, thus causing the said lever 5 to pivot about the pin 7.

The end 8, by being moved laterally, allows the card 2 to leave the connector 1.

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## CLAIMS

1. Lockable connector (1) for a smart-card (2), which includes a movable carriage (6) intended to bring the smart-card (2) from a first position, in which the said card (2) projects to the outside of the connector (1), into a second position, in which the said card (2) is immobilized inside the said connector (1) in order to be read, characterized in that the said connector (1) includes a lever (5) which is mounted so as to pivot about a pin (7) and has a first end (8) extending near the inlet (10) of the connector (1) and a second end (12) extending towards the inside of the connector (1), and in that the said carriage (6) includes at least one arm (14) which, on the one hand, laterally pushes back the said first end (8) of the pivoting lever (5) in order to allow the smart-card (2) to be inserted into the connector (1) when the carriage is in the first position and, on the other hand, laterally pushes back the second end (12) of the pivoting lever (5) when the carriage (6) is in the second position in such a way that the first end (8) of the lever (5) at least partially closes off the inlet (10) of the said connector (1).

2. Connector according to Claim 1, characterized in that the arm (14) of the carriage (6) has at least one projection (20) which exerts a thrust on the first end (8) (or alternatively the second end (12)) of the lever (5) when the carriage (6) is in the first position (or alternatively in the second position).

3. Connector (1) according to Claim 1, characterized in that each of the ends (8, 12) of the lever (5) has at least one inclined plane (22) which interacts with the projection (20) of the arm (14) of the carriage (6) in order to make the said lever (5) pivot about the pin (7).

4. Connector (1) according to one of Claims 1 to 3, characterized in that it furthermore includes a locking system (30) intended to immobilize the said

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carriage (6) in the said read position.

5. Connector according to Claim 4, characterized in that the said locking system (30) includes a first hook (32), integral with the carriage (6), which locks onto a second hook (34) mounted so as to pivot on a pivot pin (36) arranged at the bottom of the connector (1) when the smart-card (2) comes into the read position.

6. Connector according to Claim 5, characterized in that the card (2) is unlocked by making the second hook (34) pivot, releasing the first hook (32) on the carriage (6) which is then automatically pushed back towards the outside of the connector (1) under the action of a return spring.



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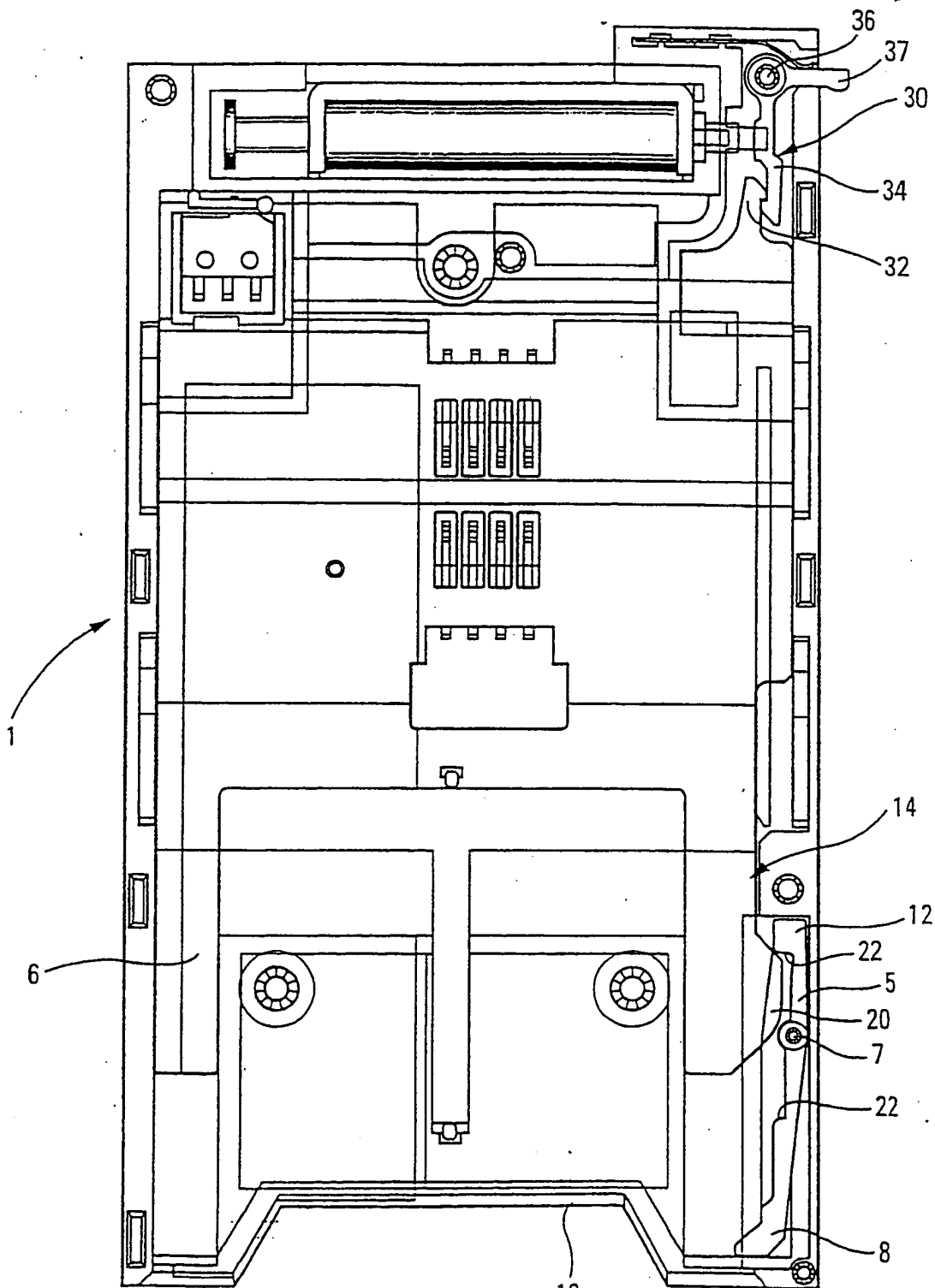


Fig. 1

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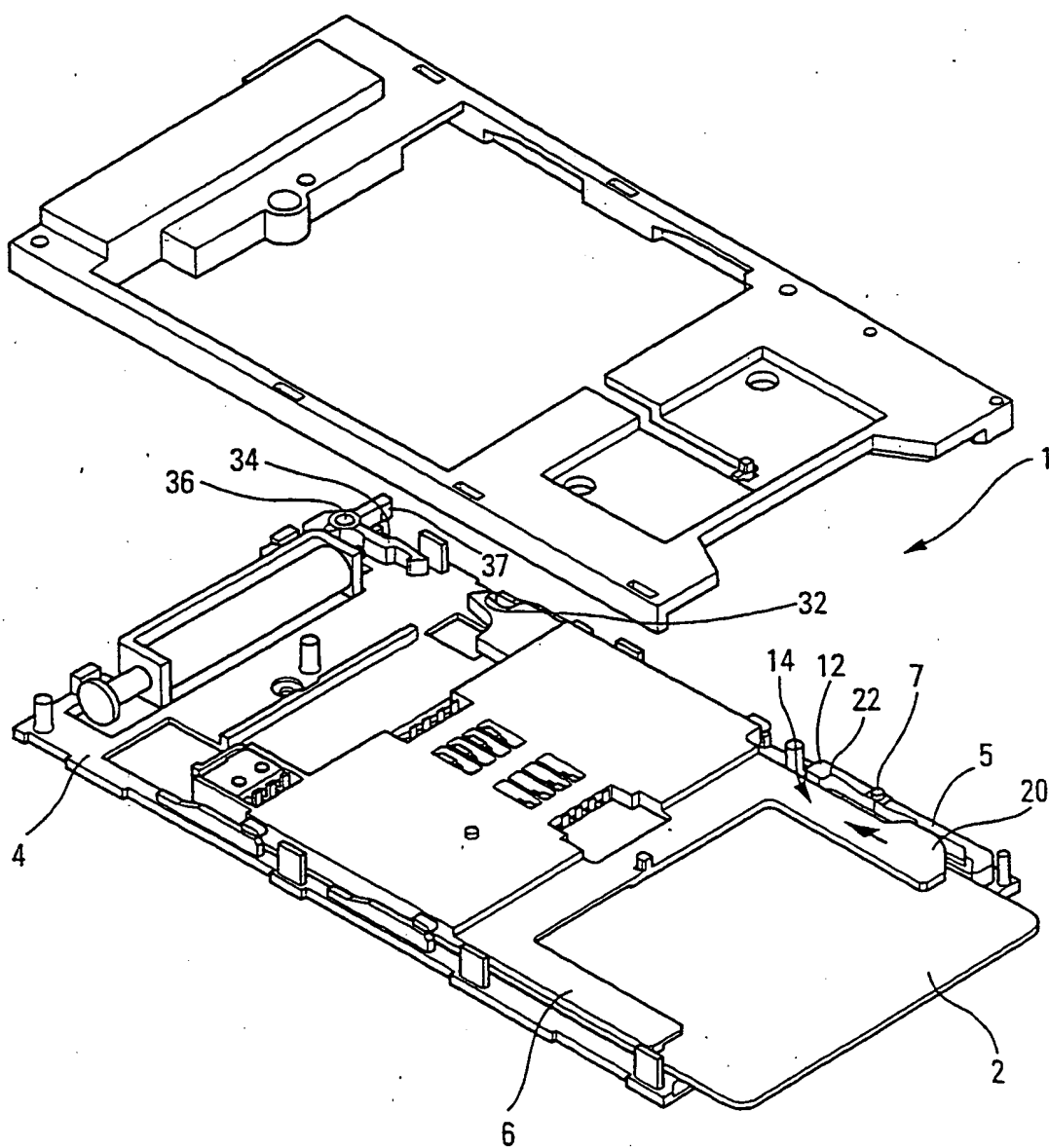


Fig. 2



# INTERNATIONAL SEARCH REPORT

International Application No

PCT/EP 99/05404

**A. CLASSIFICATION OF SUBJECT MATTER**  
IPC 7 G06K7/00 G06K13/08

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 G06K

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	EP 0 749 088 A (FRAMATOME CONNECTORS INT) 18 December 1996 (1996-12-18) column 2, line 52 -column 4, line 1; figures 1,2	1-4
A	DE 196 45 460 A (THOMAS & BETTS GMBH) 7 May 1998 (1998-05-07) column 1, line 59 -column 3, line 62; figures 1-5	1

☐ Further documents are listed in the continuation of box C.



Patent family members are listed in annex.

### \* Special categories of cited documents :

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20/10/1999

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# INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/EP 99/05404

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